August 3, 2018

Bob Sadzinski, Manager,
Power Plant Research Program
Department of Natural Resources

Dear Bob,

On behalf of the Renewable Energy Coalition (the "Coalition"), we appreciate the opportunity to provide comments to the Strengths, Weakness, Opportunities, and Threats (SWOT) analysis of the Maryland Renewable Portfolio Standard (the "RPS") and the prospects of increasing the RPS from 25% to 50% as was proposed in the 2018 Maryland Clean Energy Jobs Act.

As a way of background, the Coalition is comprised of renewable energy practitioners located in Maryland and throughout the region focused on deploying renewable energy at scale. The Coalition members include Maryland, Delaware and Virginia Solar Energy Industry Association (MDV-SEIA), American Wind Energy Association (AWEA), Utility-Scale Solar Energy Coalition of Maryland (USSEC), and the Mid-Atlantic Renewable Energy Coalition (MAREC).

In the interest of advancing the conversation of the Strengths and Weaknesses of the current 25% RPS and the Opportunities and Threats of the 50% RPS, we've provided the attached SWOT analysis and associated footnotes.

It is the Coalitions unequivocal belief that the 50% RPS with a 14.5% solar carve-out is the best path forward for Maryland to pursue its clean energy goals in the most economic manner with expansion of the in-state solar carve-out and continued Tier I supply from the least-cost PJM Tier I resources.

We appreciate PPRP's openness to the comments that follow and look forward to continuing the conversation both through the RPS working group and as the Coalition pursues the Maryland Clean Energy Jobs Act in the 2019 legislative session.

Regards,

The Coalition

CURRENT MARYLND RPS	
STRENGTHS (+)	**WEAKNESSES (-)**
• **Expanding Clean Energy** –Incentivized development of GWs of wind and solar, replacing retiring fossil fuel generators • **Maryland Solar Jobs** – The solar carveout has helped establish a sizable in-state industry with good paying jobs throughout the state. As of 2017, the state employs 5,300 Marylanders. Each help local homes, businesses, schools, municipalities and non-profits save money and generate their own power. • **Diversifying Maryland's Power Portfolio** – A more diverse set of power generation results in less volatility and exposure to supply cost escalation • **Federal Tax Credits Utilized -** Positioned Maryland to maximize the use of federal tax credits to attract long term private investment. • **Increasing In-State Energy Production** – the RPS has contributed to more of Maryland's ratepayer dollars and the benefits they represent staying in-state • **Significant Investment in Maryland Economy** – The direct investment associated with renewable energy additions extend to all counties across the state • **Local Government Tax Revenue** – The jobs and economic activity created by all segments of the renewable industry create local tax revenue and, additionally, utility-scale solar projects generate annual property tax revenue. • **Savings Delivered** - Significant long-term savings for municipalities, non-profits and others. • **Fits Into Regional Tier 1 Market & Neighboring State Programs –** The MD RPS construct fits into the RPS construct of neighboring states in PJM • **Fits into the Maryland Electricity market structure –** Maryland has a competitive wholesale electricity market and the RPS mechanism works well under the regulatory compact in Maryland.	• **SREC Oversupply** - Insufficient solar demand from carveout has resulted in oversupply and a resulting contraction of the in-state solar workforce. Boom-bust cycles cause layoffs and the need to subsequently retrain local employees. • **In-State Generation Potential Limited** by size of solar carve-out • **Inclusion of Dirty Generators** makes RPS less clean potentially exacerbating the environmental injustice issues that are rooted in air and water pollution • **Land Use Concerns** raised with significant expansion of solar on farmland and other publicly-owned land • **Majority of RPS Supply Coming from Outside Maryland** which has some questioning the local benefits both from an economic investment perspective and the air and water quality perspective • **There may be More Efficient Approaches to Increasing Renewables** (ex. RAM, LTCs, Feed-in-Tariffs, Carbon Taxes, etc.)

MDV-SEIA | AWEA American Wind Energy Association | Utility Scale Solar Energy Coalition USSEC of Maryland | MAREC Mid-Atlantic Renewable Energy Coalition

INCREASE TO 50% RPS WITH 14.5% CARVEOUT

OPPORTUNITIES (+)

- **Impactful Increase of Renewable Generation –** resulting in lower carbon intensity of the Maryland economy, and hence, reducing the risks associated with climate change that Marylanders face (i.e. extreme weather events, sea level rise, crop yield declines, etc)
- **Addresses boom-bust cycles** that have stalled job and market growth in Maryland
- **Modernizes our Electricity System** – Positions Maryland for increased grid reliability, grow new energy management markets such as storage and improve access to affordable clean energy for all.
- **Lower ACPs to Lower Costs** – By significantly lowering ACPs, ratepayer costs are minimized. The Clean Energy Jobs Act reduces solar ACPs by over 80% and wind ACPs by 40%.[1]
- **Significant Economic Benefits** – Wages, capital investment, and tax revenues far outweigh increased cost to ratepayers. ~$7.50/month direct benefit per ratepayer[1]
- **Proven Path** – MD has RPS experience/structure in place. Administratively easy to increase current program.
- **Net Increase to In-State Generation** – By expanding the solar carve-out and increasing off-shore wind, Maryland is ensuring that more ratepayer dollars stays in-state[1]
- **Opportunity to Improve Land Use**- Municipalities with brownfields, landfills can achieve long term savings with new uses for inactive land holdings
- **Diversify Revenue Sources in Rural Communities**– Development best practices and collaboration with local governments & the farming community can ensure win-win solar development.[5]
- **Renewable Cost Reductions Benefit Ratepayers** – As RPS mandate ramps up, renewable costs decline.
- **Grid reliability questioned with increased renewables penetration** – While there are concerns associated with high levels of renewable penetration, there is also an opportunity for increased grid reliability as the "smart grid" is built out to accommodate new renewable generation.[2]
- **Environmental Justice opportunity** – Jobs in frontline communities, career pipelines created in the renewable industry, reduced disproportionate impacts of carbon, air, and water pollution.[3]
- **Increase Hedge Against Fuel Price Increases** – The addition of zero fuel cost generation as a result of the RPS reduces the exposure that Marylanders face to coal and gas cost volatility.[4]

THREATS (-)

- **Increased Ratepayer Costs** - – While outweighed by the economic benefits, increasing the RPS comes with a cost. DLS projected CEJA ratepayer impact of REC and SRECs to be $1.40 - $1.85/month per ratepayer.[1]
- **Reduced Benefit if Natural Gas Prices Decline Further** – While the RPS expansion presents the Opportunity of hedging ratepayers against rising Natural Gas costs, it so too, limits the cost reduction potential if natural gas prices fall further from their historically low levels that we've seen over the last 3-4 years.[4]
- **Exposure to Reduction/Increase of RPS Goals in Neighboring States** – because the Tier 1 market operates across state lines, policy changes in other states can have an impact on compliance costs/RPS efficacy in Maryland
- **Phase-Out of Federal Tax Credits Could Increase Wind/Solar Costs** –
- **Trump Tariffs/Hostile Policies → Cost Uncertainty**
- **Ability to Meet Demand-** The RPS target may become outdated and not sized to maintain demand.

- **Potentially Limited Transmission Capacity in MD/PJM** – The hosting capacity of the transmission and distribution system within Maryland may limit the additions of cost-effective renewable additions. Transmission and distribution system build-out, if needed, could increase the cost of renewable generation.
- **Grid reliability questioned with increased renewables penetration** – While the PJM renewable integration study indicates that the wholesale electricity market can accept 30%+ renewable penetration without any reliability issues, the future cost and benefits of significant levels of renewable penetration is somewhat difficult to forecast.[2]
- **Land Use Concerns become an impediment to renewable deployments** – Land use decisions are governed predominately by localities in Maryland. If localities determine that renewables are not a compatible with agricultural land use or that the local benefits don't assuage concerns, then the level of renewable deployments in Maryland may be limited.[5]

- **Attract and Maintain Large Employers Seeking Large-Scale Renewable Supply (ex. Amazon, Apple, Google, Discovery Communications, etc.)** – Roughly half of the Fortune 500 companies have clean energy goals and access to clean energy is a driving factor in where companies site, expand and operate new facilities.[4]

See **Appendix** for Footnotes 1-5

Footnote 1: 50% RPS: Impact to Ratepayers

A cost-benefit analysis reveals that the 50% RPS scenario has a 3:1 direct benefit vs. direct cost. Costs are incurred through a modest increase on electricity prices, while benefits are accrued through higher state and county tax revenues, direct wages, and private investment.

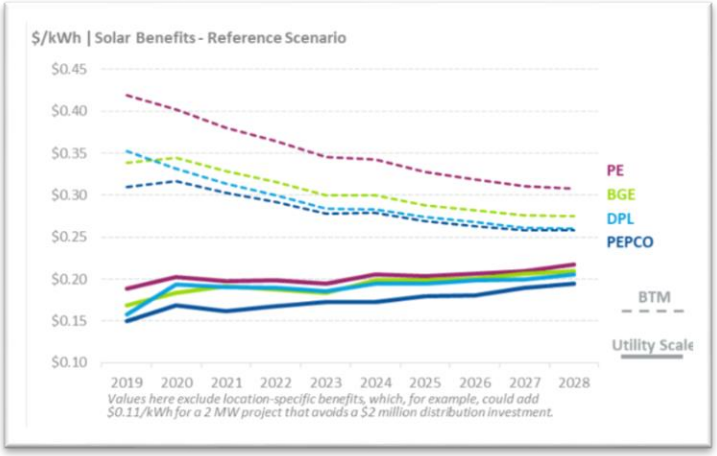
Monthly Household Electricity Bill Increases $1.45 - $1.85: The official fiscal note[1] of the Clean Energy Jobs Act in 2018 (HB 1453) estimated the average residential MWh of electricity will cost an additional $1.45 to $1.85 per month.[2]

RPS Total Cost in 2016: The Maryland Public Service Commission estimated the total cost of compliance of the RPS in 2016 was $135 million, which translates to roughly $2 per month per homeowner. During that time period, the average Tier 1 REC traded at $12.53 and Tier 1 Solar REC traded at $110.51.[3] As of July 2018, Tier 1 Solar RECs are trading at $9.75 per MWh, which suggests the total cost of compliance will be significantly lower in 2018.[4]

Reducing ACP Values Caps Ratepayer Costs: The provisions of HB 1453 ensured solar and Tier 1 Alternative Compliance Payments (ACPs) gradually declined to $22.50/MWh over time, limiting ratepayer cost and signaling that much less price support is needed over the next decade as renewables continue their downward cost decline.

Increase in Direct Wages and Investment: Using the Department of Energy's Jobs and Economic Development Impact (JEDI) model, MDV-SEIA and AWEA have calculated the total wages projected from implementing the Clean Energy Jobs Act. The model estimates $577 million in annual wage benefits to Marylanders (which equates to over $7 per month per homeowner of direct wage benefits), $864 million in annual investment benefits through construction, manufacturing, operations and maintenance of solar and offshore wind projects.[5]

Value of Solar Between $0.15/kWh and $0.41/kWh: A report drafted for the Public Service Commission on the Value of Solar in Maryland found that economic development, avoided energy, market price deflationary effects, avoided additional capacity and transmission costs account for significant benefits across all investor-owned utility territories.[6]



[1] Maryland Department of Legislative Services, Fiscal and Policy Note: HB 1453, 2018. Accessible: http://mgaleg.maryland.gov/2018RS/fnotes/bil_0003/hb1453.pdf
[2] The DLS also calculated state general and special fund expenditures would increase by $1.2 to $3 million per fiscal year as a result of higher electricity prices.
[3] Public Service Commission of Maryland, Renewable Energy Portfolio Standard Report: With Date for Calendar Year 2016, January 2018. Accessible: https://www.psc.state.md.us/wp-content/uploads/CY16-RPS-Annual-Report-1.pdf
[4] SRECTrade, "Market Prices: Maryland," July 2018. Accessible: http://www.srectrade.com/srec_markets/maryland
[5] ," AWEA and MDV-SEIA, Analysis of HB 1453: Clean Energy Jobs Act Using NREL's Jobs and Economic Development Impact Tool. 2018. Available upon request.
[6] Daymark Energy Advisors, "Benefits and Costs of Behind the Meter and Utility-Scale Solar Resources in Maryland," April 2018. Accessible: https://www.psc.state.md.us/wp-content/uploads/MD-Costs-and-Benefits-of-Solar-Draft-for-stakeholder-review.pdf

Footnote 2: Grid Reliability and Resilience

While grid reliability and resiliency have gained airtime over the past few years, analysis has shown that renewable penetration has not been a source of grid reliability issues to-date and the future likely holds the same.

Renewable Energy Is Currently Integrating Reliably into the U.S. Grid: 14 states already meet over 10% of their electricity needs from wind power; the SPP power grid now peaks at over 50% wind generation. According to Ben Fowke, the CEO of Xcel, noted in May 2017 "I don't think 5 or 10 years ago I'd be comfortable telling you we could not sacrifice reliability when we're going to have 35% of our energy come from wind. I'm telling you, I'm very comfortable with that today."

PJM Concluded Wind and Solar Growth Would Not Affect Reliability: A 2017 report[7] from the regional transmission organization found that "PJM could maintain reliability with unprecedented levels of wind and solar resources, assuming a portfolio of other resources that provides a sufficient amount of reliability services." Texas provides is a recent example of renewables' contribution during record peak demand: a scorching heat wave did not cause service disruption or price increases, thanks in no small part to significant wind generation.[8]

Reliability of Rooftop Solar Provides Cost Savings to all Residents[9]: A study commissioned by the Nevada Public Utility Commission concluded solar customers offset generation needs during peak demand, and curtail expensive transmission and capacity upgrades, leading to a net benefit to all NV Energy customers.[10] A similar study for the Mississippi concluded distributed solar can help avoid significant infrastructure investments, take pressure off the state's oil and gas generation at peak demand times, and lower rates.[11]

Extreme Weather Events – Not Lack of Fuel - Account for Vast Majority of Outages: A study by the Energy Information Administration and Rhodium Group in 2017 revealed fuel supply and generation inadequacy caused fewer than .009% of major electricity disturbances from 2012-2016.[12]

Figure 14 – Reliability services by energy resource
(Assessments below reflect the most modern equipment capabilities being installed in the U.S. today particularly for inverter-connected resources; not all installed resources have the same capabilities)

Reliability Service	Wind	Solar PV	Demand Response	Battery Storage	Gas	Coal	Nuclear
Voltage support Key: Green is positive, yellow is medium, and red indicates that in most cases the resource does not provide that service.							
Reactive power and voltage control							
Voltage and frequency disturbance ride-through							
Frequency support Note: For the following reliability services, yellow means the resource can provide the service, but during many hours it may not be the most economic choice to do so.							
Fast frequency stabilization following a disturbance (through primary frequency response and inertial response)							
Ramping and balancing							
Frequency regulation							
Dispatchability / Flexibility / Ramping							
Peak energy, winter (color reflects risk of common mode unavailability reducing fleetwide output below accredited capacity value)							
Peak energy, summer (color reflects risk of common mode unavailability reducing fleetwide output below accredited capacity value)							

Source: Grid Strategies, LLC (May 2018)

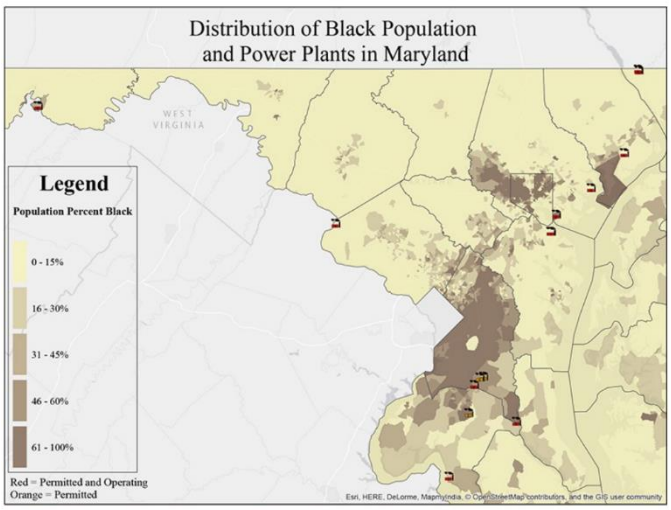
[7] PJM Interconnection, "PJM's Evolving Resource Mix and System Reliability," March 2017, Accessible: http://www.pjm.com/~/media/library/reports-notices/special-reports/20170330-pjms-evolving-resource-mix-and-system-reliability.ashx
[8] "The AC Stayed On: 3 Takeaways From Texas' Scorching Heat Wave," KUT 90.5 July 25, 2018. Accessible: http://kut.org/post/ac-stayed-3-takeaways-texas-scorching-heat-wave
[9] Environment America, "Shining Rewards: The Value of Rooftop Solar Power for Consumers and Society," Summer 2015. Accessible: https://environmentamerica.org/sites/environment/files/reports/EA_shiningrewards_print.pdf
[10] E3, "Nevada Net Energy Metering: Impacts Evaluation," July 2014. Accessible: http://puc.nv.gov/uploadedFiles/pucnvgov/Content/About/Media_Outreach/Announcements/Announcements/E3%20PUCN%20NEM%20Report%202014.pdf?pdf=Net-Metering-Study
[11] Synapse Energy Economics, "Net Metering in Mississippi," September 2014. Accessible: http://www.synapse-energy.com/sites/default/files/Net%20Metering%20in%20Mississippi.pdf
[12] Houser, Larsen, and Marsters, Rhodium Group, "The Real Electricity Reliability Crisis," October 2017. Accessible: https://rhg.com/research/the-real-electricity-reliability-crisis-doe-nopr/

Footnote 3: Environmental Justice & Energy Generation

Communities disproportionately impacted by environmental impacts of fossil fuels should have the greatest opportunity to lead on the solutions to the climate crisis.

Air and Water Pollution Disproportionately Impact Communities of Color in Maryland: People of color and low-income families in Maryland have long been disproportionately impacted by the siting and transportation of fossil fuel plants and trash incinerators.

For example, in 2016, a coalition of environmental groups in Brandywine, Maryland, filed a federal civil rights complaint against the state for permitting a new gas-fired power plant in a largely African-American community that is already subjected to high levels of pollution.[13]



Reducing Energy Burdens: Communities disproportionately impacted by air and water pollution from fossil fuel combustion also tend to be the communities with highest energy burden, also known as the percentage of their income going to energy expenses. Rooftop solar, customer choice aggregation and community solar programs empower low-income neighborhoods to stabilize energy burdens and take control of rising electricity prices.[14]

Clean Energy Provides Living Wage Jobs to Marylanders: 5,300 men and women work in the state's solar industry. Roughly half of the men and women working in the solar industry are installers, who earn a median wage of $26 an hour.[15] These jobs cannot be automated or outsourced, and do not require a bachelor's degree, making them good options for many of Maryland's more marginalized communities.

Fulfilling Maryland's Commitment to Students: Maryland has made a commitment to clean energy workforce development and empowering low-income communities with the training to install solar panels across the state. Initiatives like the EARN Program, and organizations like GRID Alternatives and Civic Works invest in people, rather than projects. A 50% RPS would create the stability necessary to guaranteeing opportunities to graduates of such programs. Market volatility will result in trained workers relinquishing new skills, seeking alternative careers, or even leaving the state to pursue jobs in the clean energy sector.

[13] Deaton, J. "In Maryland, one community is taking a stand against environmental racism," Grist.org Accessible: https://grist.org/justice/in-maryland-one-community-is-taking-a-stand-against-environmental-racism/

[14] NAACP, "Lights Out in the Cold: Reforming Utility Shut-Off Policies as if Human Rights Matter," March 2017. Accessible: https://www.naacp.org/wp-content/uploads/2017/12/Lights-Out-in-the-Cold_NAACP.pdf

[15] The Solar Foundation, "Solar Jobs Research," 2018. Available: https://www.thesolarfoundation.org/solar-jobs-decline-4-percent-nationwide-29-states-see-jobs-growth/

Footnote 4: De-risking Economic and Political Change

The writing is on the wall: businesses, politicians, and citizens are demanding clean energy and regulation of carbon dioxide. A strong RPS places Maryland on the right path in the wake of uncertain economic swings and policy regulation.

Hedge Against Fuel Price Escalation: Similar to portfolio theory that applies to financial planning, a diverse set of fuels supplying the electricity sector reduces the ratepayer cost volatility. Unlike, natural gas, nuclear and coal, renewable energy has no fuel cost. Thus the addition of renewable energy supply to the portfolio of generation serving Maryland's load will reduce the exposure that Marylander's face to fuel cost escalation.

While the last 5 years have been an unprecedented era of low-cost natural gas supply resulting in savings for customers, the Maryland grid has become more concentrated in natural gas supply which could result in electricity price escalation if natural gas prices are to rise in the future. The most cost-effective way to hedge against rising fuel costs is through the 50% RPS and the addition of fuel-free renewables that will serve the Maryland grid.

Creating a Favorable Business Climate: Numerous large employers like Walmart, General Motors, Toyota, Amazon, HP, Proctor & Gamble, Target, Google, Facebook and many others now consider proximity to large-scale wholesale renewable energy projects like large solar farms as a key variable in their site selection process for new facilities and data-centers. Nearly half of Fortune 500 companies have a clean energy or climate target.[16]

Maryland is losing this economic development opportunity to neighboring states like Virginia, where Amazon and Facebook have announced construction of numerous large facilities thanks to proximity to large-scale solar farms in the state. A 50% RPS can help attract these kinds of employers and their investment dollars to MD.

Hedging Against Carbon Regulation: In 2009, the EPA determined that emissions of carbon dioxide and other long-lived greenhouse gases that build up in the atmosphere endanger the health and welfare of current and future generations by causing climate change and ocean acidification. The Obama Administration regulated carbon dioxide under Section 111(d) of the Clean Air Act, charging states with reducing reliance on fossil generation that are found to endanger citizens.

While the current federal administration may not pursue carbon dioxide regulation, a change in leadership will likely result in a bipartisan effort to reduce greenhouse gas emissions. With that, there is consensus that there will be future federal regulation relating to carbon dioxide emissions and Maryland can position itself well against future federally-mandated requirements through a 50% RPS.

[16] World Wildlife Fund, "Power Forward 3.0: How the largest US companies are capturing business value while addressing climate change," April 2017. Accessible: https://www.worldwildlife.org/publications/power-forward-3-0-how-the-largest-us-companies-are-capturing-business-value-while-addressing-climate-change

Footnote 5: Land Use and Energy

Transforming our electricity system will not only impact air and water quality. Energy infrastructure will affect Maryland's diverse landscape – urban and rural alike.

How Local Stakeholders Shape Renewable Energy Siting: The state Certificate of Public Convenience and Necessity (CPCN) permitting process weighs local community input when considering solar deployment; nonetheless counties across the state have taken a diverse approach to siting of solar farms through ordinances. In 2016, the Maryland solar industry in collaboration with MACo agreed to legislation that strengthened the role local governments play in permitting solar farms. In September 2018, the solar industry, farm bureau, MACo, conservation organizations and other stakeholders will convene to facilitate dialogue and discuss best practices in siting.

Rural Revenue Generation and Diversification: Renewable energy projects generate investment and tax revenue, while requiring few services like water or sewer infrastructure. Co-locating solar and wind projects with agriculture enable landowners and counties alike to diversify revenue sources. Furthermore, solar projects have relatively low impacts to land arability, especially compared with residential or industrial development.

Co-locating Solar Energy with Agriculture: The majority of new solar facilities to meet the 50% RPS will be rooftop solar projects. Ground-mounted projects to meet the 14.5% solar carveout in the RPS would utilize less than 1% of the state's agricultural land, even if every project was built on land zoned for agriculture.[17]

Fostering Pollinator-Friendly Habitat: In May 2017, Maryland established a pollinator-friendly designation program from commercial solar facilities, which encourages native plants critical to supporting bee and butterfly habitat.[18] By attracting key pollinators, solar projects can enrich the surrounding agricultural land and preserve declining honeybee populations.

Limitations on Brownfield Redevelopment: A detailed analysis of 337 EPA-catalogued brownfields and landfills across Maryland identified sites sufficient to host just over 500 MW of solar farms across the state. This total does not take into account the cost of development nor consideration of the respective landowners' desire to participate in such a use. This simply identifies the aggregate capacity of brownfields and landfills in Maryland to host ground-mounted solar projects. An analysis of the average cost of solar development on landfills and brownfields indicates that the cost of such developments can be twice or more the cost of comparable solar farms on optimally situated land.[19]

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[17] This methodology assumes half of RPS solar demand (7.25% of total electricity generation) is met by ground-mounted solar projects, and each project uses 8 acres/MWac average. Based on a census of 2012 land in Maryland, this amounts 0.9% of 2.03 million acres of land.

[18] MD DNR, "Solar Generation Facilities - Pollinator-Friendly Designation," 2018. Accessible: http://dnr.maryland.gov/pprp/Pages/pollinator.aspx

[19] Numerous screens were applied to this set of data. First, the database was cleaned for data errors, including duplicate listings and erroneous parcel acreage information. As part of this first screen, land owned by the US DOD was removed from the database. The remaining acreage was then screened for land use constraints such as typical buffers around parcel boundaries and roads, and exclusion of existing structures, bodies of water, active parking lots, streams, rivers, wetlands, 100 year flood plains, and Critical Areas. Next, forested areas were removed from consideration for solar development as were slopes in excess of 10%. Several transmission proximity filters were applied to ensure interconnection feasibility. This methodology resulted in identification of potential sites to host up to 370 MWac of utility-scale solar and approximately 143 MWac of distributed & medium-voltage solar projects assuming 6 acres/MWac.